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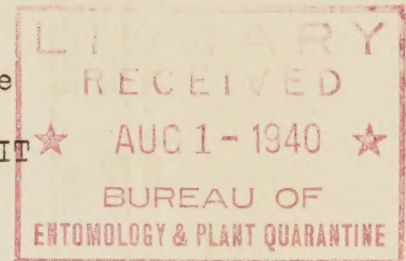
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1939

June 11, 1940.

UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Entomology and Plant Quarantine

REPORT ON COOPERATIVE WORK ON ORIENTAL FRUIT
MOTH PARASITES FOR 1939



This report reviews the cooperative phases of the biological control work on the oriental fruit moth work for the year 1939. During this period cooperative activities have been conducted with 18 state organizations under formal Memoranda of Agreement.

The cooperative work upon colonization of parasites, and the recovery studies incident thereto, has been in progress in the majority of states since 1932 and in many of these the Bureau program is considered to have been completed. In the report for the year 1934, issued June 1, 1935, it was pointed out that this program contemplates the colonization and establishment of the parasites in each infested area, but that the state organization is responsible for general distribution thereafter if it is desired to accomplish this more rapidly than by natural spread. Attention is again called to the fact that parasite colonies are not available for distribution to individual growers, though a commercial source is now available where colonies of Macrocentrus ancylivorus Roh. may be purchased.

In view of the completion of the program in a considerable number of states, the cooperative agreements with these state organizations are being terminated. Developments in these states will be followed as closely as possible, however, and the Bureau is prepared to continue cooperation informally or to reinstate the agreement at any time if changed conditions should warrant it.

PARASITE IMPORTATIONS DURING 1939

The importation program during the year was limited to a small consignment of 154 females of Phaeogenes hacussleri (Uch.) to provide a breeding stock in case further distribution in the United States is required, and approximately 17,000 host larvae parasitized by Phanerotoma grapholithae Mues. A total parasite emergence of 3,345 was secured from this latter shipment. Both of these consignments were from Japan.

PARASITE COLONIZATION DURING 1939

In table 1 is given a complete record by states of the colonies of the different parasites liberated either directly by the Bureau, or supplied to cooperating agencies for release, during the year.

TABLE 1. - PARASITE RELEASES AGAINST THE ORIENTAL FRUIT MOTH IN 1939

States	G a m b r u s s t o k e s i i		P h a n e r o t o m a g r a p h o l i t h a e		P h a e o g e n e s h a e u s s l e r i	
	Number of releases	Number of parasites	Number of releases	Number of parasites	Number of releases	Number of parasites
Connecticut	2	336				
New Jersey	1	139				
Delaware	1	150			1	134
Maryland	1	198				
West Virginia	2	296				
Georgia	3	685				
Kentucky	2	285	3	437		
Ohio	3	600	6	1,192		
Indiana	3	594	4	798		
Michigan	2	366				
Illinois	3	598	5	906		
	23	4,247	18	3,333	1	134

RECOVERY OF IMPORTED SPECIES

(Dioctes) Inareolata molestae Uch. was considered for several years to be the most promising of the imported species, and large-scale releases were made in a number of states during several seasons. In 1938 it was recovered from 31 of 58 properties in eight states where it had been released in 1937 or earlier. The 1939 recovery collections from these same properties show that it has persisted in only nine properties in three states, all of which represented 1937 releases. The average parasitization in Ohio, Indiana, Michigan and Illinois ranged from 23.7 percent in 1937, the year of release, to 14.9 in 1938 and 6.7 percent in 1939. The general experience with this species is that it builds up rapidly following release, often attaining a high percentage of parasitization, and then declines, often disappearing completely.

Occasional recoveries are being made of Bassus diversus Mues. also, but this species likewise seems to have difficulty in maintaining itself beyond the season of initial release.

RECOVERY COLLECTIONS

The 1939 survey covered only approximately one-half of the area included in those of the preceding years. The data already available from a number of states were considered to be adequate for the purposes intended, and the cooperating agencies were not called upon to make twig collections.

A total of 49,543 infested twigs were collected by the staff of the Bureau station at Moorestown, N. J., and by seven cooperating state agencies. The emergence from this material was slightly lower than in 1938. These data for the different states are given in table 2, while the details of rearings are given in table 3.

TABLE 2. - DATA ON RECOVERY COLLECTIONS - 1939

COLLECTIONS BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

State	Number of collections	Number twigs collected	Percent emergence
New Jersey	132	25,304	51.1
Pennsylvania	6	280	48.6
Maryland	30	2,343	39.9
Virginia	60	8,002	61.7
West Virginia	12	1,693	54.8
Total	240	37,622	52.8

COLLECTIONS BY COOPERATING AGENCIES

New York	7	697	45.1
Ohio	52	5,105	61.9
Indiana	42	3,100	45.4
Michigan	17	2,025	33.5
Illinois	12	769	48.6
Missouri	1	52	61.5
Louisiana	2	173	51.4
Total	133	11,921	50.8
Grand total	373	49,543	52.3

TABLE 3. - RECOVERY REARINGS FROM TWIG COLLECTIONS - 1939

State	Number twigs collected	Total emergence	<i>Macrocentrus ancyllivorus</i>	<i>Glypta rufiscutellaris</i>	<i>Macrocentrus delicatus</i>	<i>Pristomerus ocellatus</i>	<i>Cremastrus minor</i>	<i>Macrocentrus instabilis</i>	<i>Bassus diversus</i>	<i>Eubadizon pleurale</i>	<i>Cremastrus forbesi</i>	<i>Inareolata moestae</i>	<i>Inareolata oblitteratus</i>	Miscellaneous parasites
New York	697	314	70				3	1					11	
New Jersey	25,304	12,935	6,373	1,289	271	254	66	28	140	4	126		3	50
Pennsylvania	280	136	35	6	8	8								1
Maryland	2,343	934	508	12	4			1						10
Virginia	8,002	4,941	473	152	19	6		10		8				18
West Virginia	1,693	927	390	43	6	1		3			2			7
Ohio	5,105	3,161	432	44	674	24	72	48		34	1	36	13	24
Indiana	3,100	1,407	207	10	152	9	6	12		82		15	8	18
Michigan	2,025	679	212	109		2	19	39	2			7	17	12
Illinois	769	374	91		2	1	4	2		12			3	2
Missouri	52	32												
Louisiana	173	89												

The twig collections were made during May to August, inclusive, with the greatest number collected during June. In previous reports a tabulation has been given of the average parasitization of larvae in twigs for each of these four months. The comparable figures are not available for 1939 because of the reduced area covered by the survey. Field parasitization of larvae in twigs in excess of 70 percent during one or more months was recorded in the following 17 counties:

West Virginia	New Jersey
Berkeley	Mercer
Ohio	Indiana
Belmont	Floyd
Fairfield	Jackson
Hamilton	Knox
Lucas	Michigan
Medina	Allegan
Ottawa	Monroe
Sandusky	Van Buren
Summit	
Wayne	

Of all counties surveyed, 27.9 percent showed an average parasitization of 70 percent, or higher during at least one month, in 1939, as compared with 27.3 percent in 1938. The average parasitization over the entire season showed an appreciable decrease from the 1938 figures. Marked changes have occurred in several sections, such as Albemarle and Nelson counties in Virginia, where there was a considerable decrease in the Macrocentrus population, and in Augusta and Frederick Counties in the same state, where there was a marked increase in abundance of this same parasite. Burlington County, New Jersey showed a considerable decrease whereas Mercer County revealed a marked increase.

A total of 30 species of parasites were reared from the 1939 collections. Macrocentrus ancyllivorus Roh. heads the list, having been recovered from 67.5 percent of all properties, and is followed by M. delicatus Cress., Glypta rufiscutellaris Cress. and M. instabilis Mues., in the order given.

PLANS FOR THE 1940 SEASON

One of the principal activities of the Moorestown station during 1940 will relate to the development of methods for the production of certain parasites, and particularly Macrocentrus ancyllivorus, on a large scale at as low a cost as possible. For this latter parasite, experimental production will be undertaken as follows:

1. Overwintering in fruit moth larvae.
2. Overwintering in strawberry leaf roller.
 - a. From fall collections of host material.
 - b. From early spring collections of same.
 - c. Mass breeding upon leaf roller during the winter.

3. Rearing in field cages over leaf roller infested strawberry.
4. Rearing by open field releases over strawberry.

The purpose of these experiments is to develop methods whereby state and other organizations may produce economically a sufficient supply of parasites for colonization in orchards and sections where they are not at present established.

The possibility of securing earlier and greater effectiveness of Macrocentrus, even in sections where it is well established, through mass liberations will also be determined. If such a practice is feasible the large scale production mentioned above will assume much greater importance, as the required numbers will not be available from present sources at the time they will be needed for liberation. Mass liberations may also prove to be a means by which Inareolata and Bassus, two imported species which have not been able to maintain an effective status in the field, may be utilized in place of, or in conjunction with M. ancylivorus.

The field colonization program is limited to Macrocentrus ancylivorus and provides for limited liberations in several states where adequate establishment has not yet been secured.

The field recovery program, which represented a large part of the work of previous years, will be further restricted and, except in special cases, cooperating agencies will not be asked to make such collections.

No importations of foreign parasites will be made during the year, and the work in Japan and Korea will be devoted to the completion of the alternate host survey.

Lee A. Strong

Chief of Bureau

